Research

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I divide my research into several areas that are more specific than general fields of interest.

Real Estate Economics and Finance

● *Mikhed, V. and Zemčík, P. (2009). "Testing for Bubbles in Housing Markets: A Panel Data Approach," Journal of Real Estate Finance and Economics 38, 2009, 366-386.*
● *Mikhed, V. and Zemčík, P. (2009). "Do House Prices Reflect Fundamentals? Aggregate and Panel Data Evidence," Journal of Housing Economics 18, 2009, 140-149.*
● *Zemčík, P. (2011). "Is There a Real Estate Bubble in the Czech Republic?" forthcoming, the Czech Journal of Economics and Finance.*

Starting this line of research was a conscious decision on my part. Specifically, I intended to apply my skills in financial econometrics to analyze real estate bubbles. In the JREFE paper with Vyacheslav Mikhed, we formulate a conceptual framework of testing for property bubbles using non-stationary panel data. The framework consists of several building blocks. The first is the standard present-value model, where real estate prices reflect the future stream of rents. The model implies that (potentially) non-stationary prices and rents should move together. We are the first to have used a panel of rents in this context. In the second part of our framework, we use newly available panel-data unit root tests to see if prices and rents are stationary. We only suspect a bubble for non-stationary prices. The third block tests whether prices move together with rents. If rents have a unit root and prices do not then there is a bubble. In this case, we set the value of our bubble indicator to unity. If both prices and rents are non-stationary, we test for a unit root in the price-rent ratio. Our bubble indicator is set to the p-value of this unit root test. High p-value means greater likelihood of a bubble. We show that this produces same results as in testing for panel data cointegration between prices and rents. We calculate the value of our indicator using overlapping ten-year periods and its values were high in the US in the late 1990s and early 2000s. The final block of our methodology tests the prediction of the present-value model that changes in rents should predict changes in prices and viceversa. For this purpose, we use novel econometric techniques to test for Granger causality in the panel data.

I use our framework to show that there is a (small) real estate bubble in the Czech Republic. The methodology can be applied to stock prices and some measure of fundamentals: see Chiang, tsai, and Lee (2011).[1] The JREFE paper is very popular. As of February 12, 2011, it had been downloaded 388 times from websites of the Social Science Research Network (SSRN) and the Research Papers in Economics (Repec). On January 20, 2011, the paper was among the top five most downloaded articles at the JREFE website. It has been cited 12 times, two of these citations were in the Web of Science.

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[1] "Fundamental indicators, bubbles in stock returns and investor sentiment." The Quarterly Review of Economics and Finance 51, 82-87.

The JHE paper uses not one, but several fundamental factors to see if US real estate prices are overvalued. They were, up to 2006. Also, the paper illustrates conditions under which the present-value model is equivalent to a supply-demand housing model and derives a log version of the equation for real estate prices, which is often used but typically not theoretically justified. This paper is popular as well, with 369 downloads at SSRN and Repec and 12 citations, two of which were at the Web of Science. Note that JREFE and JHE are together with Real Estate Economics the only real estate journals listed under Economics and/or Finance at the Web of Science.

- *Tsharakyan, A. and Zemčík, P. (2011). "Rent Deregulation, Tenure Choice, and Real Estate Price Expectations" submitted to Journal of Urban Economics.*
- *Seč, R. and Zemčík, P. (2007). "The Impact of Mortgages, House Prices and Rents on Household Consumption in the Czech Republic," CERGE-EI Discussion Paper 2007-185.*

Deregulation of rents in the Czech Republic is a natural experiment where the legally set maximum rent increase depends explicitly on property prices. This experiment can be studied thanks to available data. While the data are from cross-sectional consumption surveys, it turns out that only about 25% of the sample is replaced each year. This enables Ashot Tsharakyan and I to follow a particular household over time, including its tenure decision, i.e. whether to own or to rent. In addition, the data can be matched with property prices. We find (among other things) that households in regulated apartments are more likely to become owners due to the deregulation process. The unique nature of the process makes it also possible to derive expectations regarding the growth of property prices based on the tenure choice of households. These expectations seem to be very conservative and do not show signs of irrational behavior. We plan to exploit the idiosyncratic characteristics of the Czech data some more and estimate the impact of property prices on consumption, extending my research previously conducted with Rastislav Seč.

Equilibrium Asset Pricing Models

- *Zemčík, P. (2001). "Mean Reversion in Asset Returns and Time Non-Separable Preferences," International Review of Economics and Finance 10, 223-245.*
- *Zemčík, P. (2001)."An Empirical Investigation of the Consumption Based Capital Asset Pricing Model Using a Modified Variance-Ratio Test," Journal of Economics and Finance 25(1), 1-21.*

Here I focus on the impact of time non-separability in preferences (durability or habit persistence) on properties of stock returns implied by a consumption-based capital asset pricing model (CCAPM). Initially, the CCAPM with time non-separable preferences and standard power utility function seemed to generate mean-reverting stock returns. However, it was later shown that this was due to a misspecified endowment process. A simple autoregressive process for consumption, dividends, or output failed to model heteroskedasticity in the data. Once this is taken into account, the CCAPM with constant relative risk aversion cannot generate predictable asset returns. My idea was to intro-

duce time non-separability into the mix, which was captured by lagged consumption in the preferences. If consumption yesterday is a substitute for consumption today, there is durability (think of a haircut). If they are complements, there is (internal) habit persistence. The consumption process is modeled using a two-mean, two-variance Markov switching model. Results are interesting and relevant even today. The negative autocorrelation in the US annual stock returns (the basis for contrarian investment strategies) can be generated by the CCAPM with habit persistence. The positive autocorrelation in monthly stock returns (representing momentum) can be matched only with durability. In addition, habit persistence can generate negative expected excess returns in some states of the world, which is difficult to achieve in asset pricing models. The CCAPM can only produce sufficiently high equity premium for strong habit persistence.

- *Pakoš, M. and Zemčík, P. (2011). "Deepening of the Equity Premium Puzzle?" Report on work in progress.*
- *Zemčík, P. (2006). "Housing, Consumption, and Stock Returns: A Joint Econometric Model," CERGE-EI Discussion Paper 2006-163.*

My interest in housing has led me back to the CCAPM as a vehicle to understand the properties of asset returns. Michal Pakoš and I plan to contribute to the asset pricing literature in three major ways. The first addresses the equity premium puzzle. Rather than seeing if a model generates an adequate equity premium, we focus on restrictions imposed by returns on the moments of a stochastic discount factor, known as the Hansen-Jagannathan volatility bounds. Our innovation is to include property returns in addition to stock and bond returns. Our next contribution is constructing quarterly real estate returns, which include rents as a measure of cash flows associated with investment in property. We have already constructed these returns solely from the data on National Income and Product Accounts. To be able to do this, we had to adopt a methodology previously used to estimate the quarterly stock of durables from annual stock and quarterly flows data. We apply this methodology for residential investment and fixed assets. Finally, we attempt to combine consumption of durables and housing in the utility function to investigate if the CCAPM can match the data equity premium with a low risk-aversion parameter. Should we find such a model, we will model its stochastic discount factor jointly with excess stock and property excess returns using a tri-variate Markov switching process I had developed earlier.

- *Rybár, I. and Zemčík, P. (2007). "ARM or FRM: Which Mortgage Contract Is Better for Czech Households?" CERGE-EI Discussion Paper 2007-183.*

We calibrate an existing finite cycle CCAPM to the Czech data to compare consumer welfare related to adjusted-rate mortgages (ARM) and fixed-rate mortgages (FRM). This research is part of a project financed by the Czech Science Foundation and will have to be completed by the end of 2011. Our simulations indicate that FRM is preferred to ARM in most cases, which is in contrast to results appearing in the literature using US data. We assume this is due to greater inflation and interest rate uncertainty in the Czech Republic up to the early 2000s.

• *Poghosyan, T., Kočenda, E. and Zemčík, P. (2008). "Modeling Foreign Exchange Risk Premium in Armenia," Emerging Markets Finance and Trade 44(1), 41-61.*

We use stochastic discount factor methodology to analyze Armenian data on deposits. These include deposits in both foreign and domestic currencies, thus eliminating transaction costs and cross-country risks. We can therefore focus purely on the exchange rate risk.

Beta Pricing Models and Reduced Rank Regression

• *Morgese-Borys, M. and Zemčík, P. (2010). "Size and Value Effects in the Visegrad Countries," forthcoming, Emerging Markets Finance and Trade.*
• *Gilbert, S. and Zemčík, P. (2008). "Sizing up the Errors in Models of Systematic Risk," mimeo.*
• *Gilbert, S. and Zemčík, P. (2006). "Inter-Asset Comparisons of Betas and Returns to Small and Large Firms' Stocks," mimeo.*

By beta pricing models I mean the multi-factor models, which include the standard Capital Asset Pricing Model as a univariate special case and the Fama-French model. It is often not considered explicitly that betas are in fact estimates of the underlying measure of risk and not the true values. Scott Gilbert and I concentrate on a formal statistical comparison of betas across assets and identify the Hansen J-test with simple pre-whitening of the residual variance-covariance matrix as the best available test for this purpose. Testing of betas across assets sorted by size yields various insights into the nature of the so called small size effect. We then proceed with an ambitious objective to comprehensively evaluate beta pricing models. We define an error as the difference between actual and predicted returns. We decompose the error's variance into a bias term and a variance term. Our statistic is fairly intuitive but has a non-standard distribution and is not easy to use. Magda Morgese-Borys and I construct Fama and French size- and value-related factors for a market combining stock markets in Poland, Czech Republic, Hungary, and Slovakia.

• *Gilbert, S. and Zemčík, P. (2006). "Who's Afraid of Reduced Rank Parameterizations of Multivariate Models? Theory and Example," Journal of Multivariate Analysis 97(4), 925-945.*
• *Gilbert, S. and Zemčík, P. (2005). "Testing for Latent Factors in Models with Autocorrelation and Heteroskedasticity of Unknown Form," Southern Economic Journal 72(1), 236-252.*

The beta pricing models are essentially systems of N equations with K regressors. The parameters form a coefficient matrix, in which rows and/or columns may be dependent., leading to reduced rank restrictions. Scott Gilbert and I extend, generalize, and at the same time significantly simplify the existing methodology in testing for reduced rank. Our estimator minimizes the distance between a given full-rank estimator of the coefficients matrix and its restricted counterpart. When the plug-in matrix is estimated by

unconstrained maximum likelihood, the minimum distance estimator is asymptotically equivalent to the constrained maximum likelihood. Since the constrained maximum likelihood is often difficult to calculate, there is significant reduction of computational burden. Our test for reduced rank is then based on the ratio of asymptotic densities associated with the constrained and unconstrained models. We use it to test for a reduced number of latent factors in the markets for US stocks and bonds. There are at least two factors for stock and two for bonds but they are not the same ones. We then describe our test in detail in the JMVA paper, which illustrates the use of the test using a labor example. This paper was previously invited for revision in the Journal of the American Statistical Association but was rejected in the second stage.

Miscellaneous

- *Hanousek, J., Kočenda, E. and Zemčík, P. (2008). "Bond Market Emergence: The Case of Serbia," Journal of Emerging Market Finance 7(2), 2008, 141-168.*
- *Seskar, L. and Zemčík, P. (2008). "Regulation, Ownership, and Liquidity on the Serbian Stock Market," Jefferson Institute, Belgrade.*

Both of these studies originated from our cooperation on projects with the Jefferson Institute in Belgrade for the Serbian National Bank and the Serbian Securities Exchange Commission. The first study shows that a standard Nelson-Siegel yield curve can be used to analyze an emerging market with government bonds in Serbia. The second study assesses the legal framework for operation on the Serbian stock market, which is surprisingly close to the Anglo-Saxon type even though actual law enforcement may be lagging behind Western standards.

- *Zemčík, P. (2009). Asset Pricing and the US Financial & Real Estate Markets. CERGE-EI, Prague.*

This book was prepared to support my Docent application at Charles University. The process has been initialized and is due to be completed by the end of 2011. This title is very important as a certain number of Docents at CERGE-EI is needed to qualify for the accreditation of our various teaching programs and it also plays a role in local fund-raising.

- *Jurajda, Š., Lízal, L., Munich, D. and Zemčík, P. (2006). "Prague Summer Olympic Games 2016: Economic Impact Study," Politická ekonomie 4, 490-507.*

This study contributed to the discussion whether Prague should host the Summer Olympic Games (SOG) in 2016 or 2020. Using a simple input-output model we show that hosting the SOG would generate at most an extra 1% of the Czech GDP, assuming there would be no misuse of resources. The study raised the local profile of CERGE-EI.

- *Tóth, P. and Zemčík, P. (2006). "What Makes Firms in Emerging Markets Attractive to Foreign Investors? Micro-evidence from the Czech Republic," CERGE-EI Working Paper 2006-294.*
- *Kinoshita, Y., Valachyová, J., Tóth, P. and Zemčík, P. (2006). Foreign Direct Invest-*

ment in the Czech Republic Prior to Joining the European Union. Edited by P. Zemčík, CERGE-EI, Prague.

We analyze what determines the level of foreign ownership in Czech firms. For example, labor costs and corporate tax differentials between the Czech Republic and the home country of a foreign owner and ownership concentration in a Czech's firm industry both increase the stake of foreigners. The article has been cited twice, once in the Web of Science. It was published in the above-listed book on Foreign Direct Investment in the Czech Republic, which I edited.